

Testimony of Dr. Ray O. Johnson  
Senior Vice President and Chief Technology Officer  
Lockheed Martin Corporation

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**Chairman Boucher, Ranking Member Stearns,** and members of this subcommittee, good morning and thank you for inviting Lockheed Martin Corporation to participate in today's hearing on the Radio Spectrum Inventory Act. My name is Dr. Ray Johnson, and I serve as Lockheed Martin's Senior Vice President and Chief Technology Officer. My role in the corporation provides me with a broad perspective of important spectrum issues relevant to the discussion today. I appreciate the opportunity to contribute, and I am honored to offer input that may help inform your consideration of these important policy matters.

Lockheed Martin is a global security company that employs approximately 140,000 people, and is principally engaged in the research, design, development, manufacture, integration, and sustaining of advanced technology systems, products, and services. Most of these systems and solutions depend on access to the spectrum. Our customers include a broad array of agencies, both military and civil, for whom we support diverse critical security missions, both at home and abroad. At any given time, Lockheed Martin holds approximately 400 FCC authorizations for a variety of uses, including experimental licenses that enable the testing of new technologies, as well as new applications for existing technologies.

As a general matter, spectrum scarcity is not a problem that is unique to FCC licensees. Based on our understanding, some Federal Government users are experiencing the same pressure as they are required to meet the increasing demands of their critical roles and missions, and to accommodate the technologies needed to fulfill these demands. Therefore, it is an important balance that H.R. 3125 achieves by requiring an inventory across both federal and non-federal spectrum resources to be conducted by the individual agencies, FCC, and NTIA.

Through our own activities in developing advanced systems and solutions to meet many Federal Government needs, we see a growth in requirements in terms of access to bandwidth-intensive applications – whether video streaming from an unmanned vehicle or surveillance from a high altitude airship. With respect to unmanned aerial systems (UAS) alone, there has been a 25-fold increase in their use since 2001; the full motion video feeds from these UAS are greatly increasing bandwidth demand for both live operations and training conducted from and within the Continental United States (CONUS). As the Subcommittee members may know, many of the large UAS currently in operation in Afghanistan and Iraq are being operated and controlled from CENTCOM in Florida.

Lockheed Martin is also in the process of conducting a communication needs analysis for 2010 operations in Afghanistan. The upcoming “surge” of U.S. forces alone will demand additional resources, which we believe will require both additional US Department of Defense spectrum resources and more intelligent management of all resources through use of such techniques such as Frequency and/or Time Division multiplexing of users at central hubs. As the requirements expand, it is critical that our soldiers are able to train as

they are expected to fight, and fight as they were trained – with access to the full complement of equipment, networks, and other tools necessary for them to succeed in their mission. Again, these are drivers for the Department of Defense to continue to seek solutions that allow it to meet its operational requirements within existing spectrum resources.

In an effort to develop ways to meet the need for these bandwidth-intensive applications, DOD and industry are working on tools and techniques to address spectrum access challenges by allowing more dynamic, flexible, and autonomous spectrum access. These capabilities will enable wireless devices to dynamically adapt their spectrum access according to criteria such as policy constraints, spectrum availability, propagation environment, and application performance requirements. New techniques that may enhance opportunities for sharing between federal and non-federal users, such as “dynamic spectrum access”, are still maturing, and they will require the development of a new spectrum governance process to ensure that all authorized users of the shared spectrum are protected, as agreed. In terms of tools to address this issue, the Coalition Joint Spectrum Management Planning Tool (CJSMPT) is just one facet of DOD’s efforts to improve its spectrum management capabilities, precisely to gain better efficiency and effectiveness in the use of this critical resource. CJSMPT, which Lockheed Martin developed with Department of Defense funding, is in response to the increasing operational congestion and limitations faced by our warfighters today, while simultaneously improving our ability to deconflict Electronic Warfare and communications spectrum requirements. CJSMPT is Increment 1 of GEMSIS (Global Electromagnetic Spectrum Information System), a DISA program of record for providing

end-to-end spectrum management capabilities and services supporting the needs of the Department of Defense and the warfighter.

Lockheed Martin is also developing new global communications analysis and ISR (Intelligence, Surveillance, and Reconnaissance) tools enveloping the C4ISR mission environment. This toolset will soon be capable of rapidly diagnosing mission needs and of identifying optimal configurations. Such analyses are not only important to the successes in current overseas missions, but may also educate policy makers and enable them to avoid inadvertently limiting critical spectrum access for both training within, and operational activities from, CONUS.

In terms of technologies, Lockheed Martin is the prime contractor on a DOD satellite system, Mobile User Objective System (“MUOS”), that will implement this type of technology in the UHF band (225-400 MHz band, which is the primary band used for military tactical communications today) by using radios capable of detecting the presence of other users, and consequently transmitting in a manner that mitigates interference with other uses as well as suppressing the impact of interference from those users. Assuming success is demonstrated in this broader innovation, this capability could result in increased access to spectrum in near-real time between and among federal users, thus improving the utilization of spectrum, including perhaps the commercial spectrum.

Lockheed Martin also suggests that the Federal Government’s investment in spectrum-based technologies and applications has produced a series of the most important wireless innovations in our nation’s history, pioneering many of the innovations that now serve as the foundation of the commercial wireless industry, including spread spectrum communications, satellite video and data, RFID, and the GPS applications industry.

Moreover, cutting edge DOD research & development has not only had a positive impact on the downstream U.S. commercial industry, it also enables continued American leadership in global defense exports. According to the Aerospace Industries Association, the aerospace and defense sector was the largest net positive contributor to the US balance of trade, logging a \$57 Billion surplus in 2008, with U.S. military aircraft representing a \$54.7 Billion export market; and, in 2007, U.S. defense exports alone constituted a \$25 billion market. This segment reflected the gradual rise in aircraft research and development, aftermarket labor and materials, and UAV production and support. For aircraft production, fighter planes are responsible for the largest share of revenues, followed by helicopters and military transports. C4ISR networks and systems to enhance allied interoperability are predicted to be the most in demand. Retaining this leadership position is vital to both our economic and national security - it translates into retaining highly skilled jobs at home and ensuring that the US and Allies have the best tools at their disposal to confront today's global security challenges at home and abroad. Thus, it is in our national interest to ensure that the increasing needs of ALL users of spectrum – both federal and commercial – be understood and accommodated to enable the full range of innovation, societal, and security gains.

Lockheed Martin endorses the enactment of H.R. 3125, the “Radio Spectrum Inventory Act.” We do, however, have some concerns with the bill as it was introduced, and respectfully suggest that the bill be modified to reflect the following issues.

First, I note that the stated purpose of H.R. 3125 is to promote spectrum efficiency. While the bill does not explicitly require that NTIA and the FCC conduct an efficiency analysis of spectrum usage, the proposed § 119(a)(1)(E) as added by the bill steers the agencies in

that direction. However, there is no single metric that spans across all communications and non-communications uses of spectrum, which can be used as a point of comparison among all of the disparate uses of spectrum. A simple intensity-of-use measure which does not differentiate between types of uses would improperly conclude that essential wireless applications that do not involve constant or intense transmission are somehow inefficient. I would also note that efficiency improvements should not be equated to the reduction of bandwidth utilized – it can also entail the use of technologies that can more effectively share spectrum or serve as better neighbors to adjacent spectrum users. On this general point, it is also critical to recognize and reflect that a highly effective spectrum-dependent system may not transmit at all, or only infrequently. An intensity-of-use metric is not correlated with effectiveness or efficiency for many spectrum uses. Such a metric is inappropriate for public safety communications systems, which require a guarantee of availability and reliability that often can only be achieved through dedicating spectrum resources even if those resources are not constantly in use. Measuring spectrum efficiency using as a proxy the price entities are willing to pay for a license is also inappropriate. Many critical spectrum users deliver tremendous value to our country – most importantly our national and homeland security – but do not directly generate revenues. There are also internal business applications that do not generate revenue, but rather decrease production or distribution costs, or provide for employees' safety and security.

Second, we are concerned that the bill would inadvertently require FCC and the NTIA to disclose sensitive information that should not be disclosed. This disclosure does not only impact the Federal Government, but it also impacts some FCC licensees. For example,

Lockheed Martin holds experimental authorizations for specific testing in certain frequency bands which are classified. Maintaining the integrity of the classified license is critical. We note that the Administration has expressed to the Subcommittee its own concerns regarding the protection of sensitive information as well. We agree with the stated concern, and note that from an information security management perspective, it is very important to recognize that the release of individual unclassified data points can result in sensitive information being improperly disclosed when viewed in the aggregate.

Third, I would like to raise a concern to the Subcommittee regarding the possible misinterpretation of the legislation in two ways. One is the potential inadvertent message to our allies in the international community, given the scope of the frequencies being inventoried and the provision requiring recommendations for reallocation. The Department of Defense and the defense industry have worked hard to promote, achieve, and maintain international spectrum harmonization to support allied interoperability of equipment, technologies, and capabilities. For example, the 225-400 MHz band is defined by NTIA as a “critical military radio communications band that has been preserved for military operations by the North Atlantic Treaty Organization (NATO), within individual NATO member countries”, and outside NATO among allied nations in the European Cooperation Partner nations and the Partners for Peace nations. The other concern is the requirement for an annual review of spectrum – this review may create an impression of volatility and instability in spectrum allocations, thus impacting long-term research and development, acquisition, and deployment of new systems and solutions. Advanced technology projects require significant lead-times for research, development, testing, and deployment. Moreover, analogous with the level of investment required for

these systems, the expected operational lifetimes of these systems are measured in decades, not years. Therefore, suggestions of instability in spectrum access could result in a chilling effect on long term technology investments that many U.S. industries, as well government agencies, rely on.

Finally, we have identified a few technical issues with the drafting of the bill which we will submit separately to the staff.

Mr. Chairman, I appreciate having this opportunity to testify. H.R. 3125 is a good start, and Lockheed Martin commends you and the other co-sponsors for identifying the need for a spectrum inventory and for taking the initiative to draft legislation to address the issue. We hope that you will agree that our suggestions will improve the bill, and we look forward to working with you and the Committee staff throughout the legislative process.

I will be happy to answer any questions that you may have.